

Figure 1—A, B—*Eucalyptus pendens* sp. nov. A—Buds (Brooker 1853). B—Fruit (Brooker 1949). C—E—*Eucalyptus sepulchralis* F. Muell. C—Buds (Middle Mt. Barren, Gardner 2976). D—Fruit (Gardner 2976). E—Fruit (cultivated Hamel nursery, FRI 15797).

# Four new taxa of *Eucalyptus* from Western Australia

By M. I. H. Brooker\*

## Abstract

Four taxa of *Eucalyptus* are described—*E. pendens* from the Badgingarra district, *E. acies* from the Fitzgerald River Reserve, *E. loxophleba* subsp. *gratae* from the Lake Grace district, and *E. conglobata* subsp. *fraseri* from the country north of Esperance and east of Norseman.

## *Eucalyptus pendens* M. I. H. Brooker sp. nov. (Figures 1 A, B, 2)

*Eucalypto sepulcrali* F. Muell. affinis a qua alabastris minus elongatis et fructibus minoribus non-urceolatis differt.

*Frutex* "mallee" 2-5 m altus ramificatione laxa demum pendente. *Ramuli* juvenes quadrangulares cortice laevi atro-rubra nitenti glauca. *Ramuli* maturi et caules cortice laevi cinereo-erubescenti. Glandulae oleorae in cortice et in medulla nullae. Lignotuberum formans.

*Cotyledones* reniformes 1.4-3.0 x 1.1-1.5 cm, triplinerves, supra virides, infra purpureae.

*Folia plantulae* sessilia, decussata, elliptica vel ovato-oblonga undulatescentia, 2-5 x 1-4 cm. *Axis* plantulae laevis. *Folia intermedia* breviter petiolata, decussata, late-elliptica, valde undulata, usque ad 16 x 8 cm. *Folia matura* petiolata, in gemma decussata, demum ab intranodiis separata, lanceolata, 6-12 x 1-2 cm costa in pagina una vel utrinque impressa, dense reticulata, sine glandulis oleosis manifestis, viridia, concoloria. Petioli complanati, 2-3 cm longi.

*Inflorescentiae* axillares, 7-11(13)-florae. Pedunculi erecti, validi, in sectione transversali ovales vel complanati ad apices latiores, 1.5-4.0 cm longi. *Involucrum* 6-bracteatum, bracteis 5-6 mm longis pro longitudine maxima connatis, demum deciduis. Inflorescentiae bracteatae in axillis foliorum dum inflorescentiae maturae expansis in ramulis vetioribus defoliatis praesentes. *Alabastra* clavata sine cicatricibus abscissis, 9-11 x 6-8 mm, in pedicello complanatos vel quadrangulares 3-8 mm longos angustata. *Operculum* hemisphaericum interdum umbonatum, vel conicum, verrucosum interdum radiatim 2-3-costatum, hypanthium aequans vel brevius. *Stamina* omnia fertilia. Filamenta alba, in alabastro radiale inflexa, eglandulosa, acuminata. *Antherae* dorsifixae versatiles, reniformi-orbiculares, ab rimis obliquis, ovalibus, non-confluentibus dehiscentes. Glans terminalis. *Stylus* glandulosus, interdum ad apicem flexus. *Ovarium* 4-5-loculare, in hypanthio profunde impressum. *Ovula* verticaliter 2-seriata.

*Fructus* ovoideus vel cylindricus, truncatus, 1.3-2.0 x 1.2-2.0 cm, rugosus vel parum costatus. Discus obliquus ad verticalis. Valvae 4-5, profunde inclusae.

*Semina* 4-5 x 3-4 mm, latere dorsali rotundata, ventrali cum porcis aliquot ad hilum ascendentibus, nigra. *Ovulodia* angularia, quam semina minora, rufa.

*Type*: At 125 mile peg north of Perth on highway between Gingin and Badgingarra, Western Australia (30°14'S, 115°28'E), 23 July 1969, M. I. H. Brooker 1949. (holo: PERTH; iso: PERTH, FRI, K).

Allied to *E. sepulcralis* F. Muell. but differing in the less elongate buds and in the fruit which are smaller and not urceolate.

*A mallee* 2-5 m tall with a light, finally drooping canopy. New *branchlets* quadrangular, bark smooth, dark red, shining, glaucous. Older branchlets and main stems with pinkish-grey smooth bark. Oil glands absent in both bark and pith. Capable of forming lignotubers.

*Cotyledons* reniform, 1.4-3.0 x 1.1-1.5 cm, triplinerved, green above, purple beneath.

*Seedling leaves* sessile, decussate, elliptical or ovate-oblong, becoming undulate, 2-5 x 1-4 cm. *Seedling axis* smooth. *Intermediate leaves* shortly

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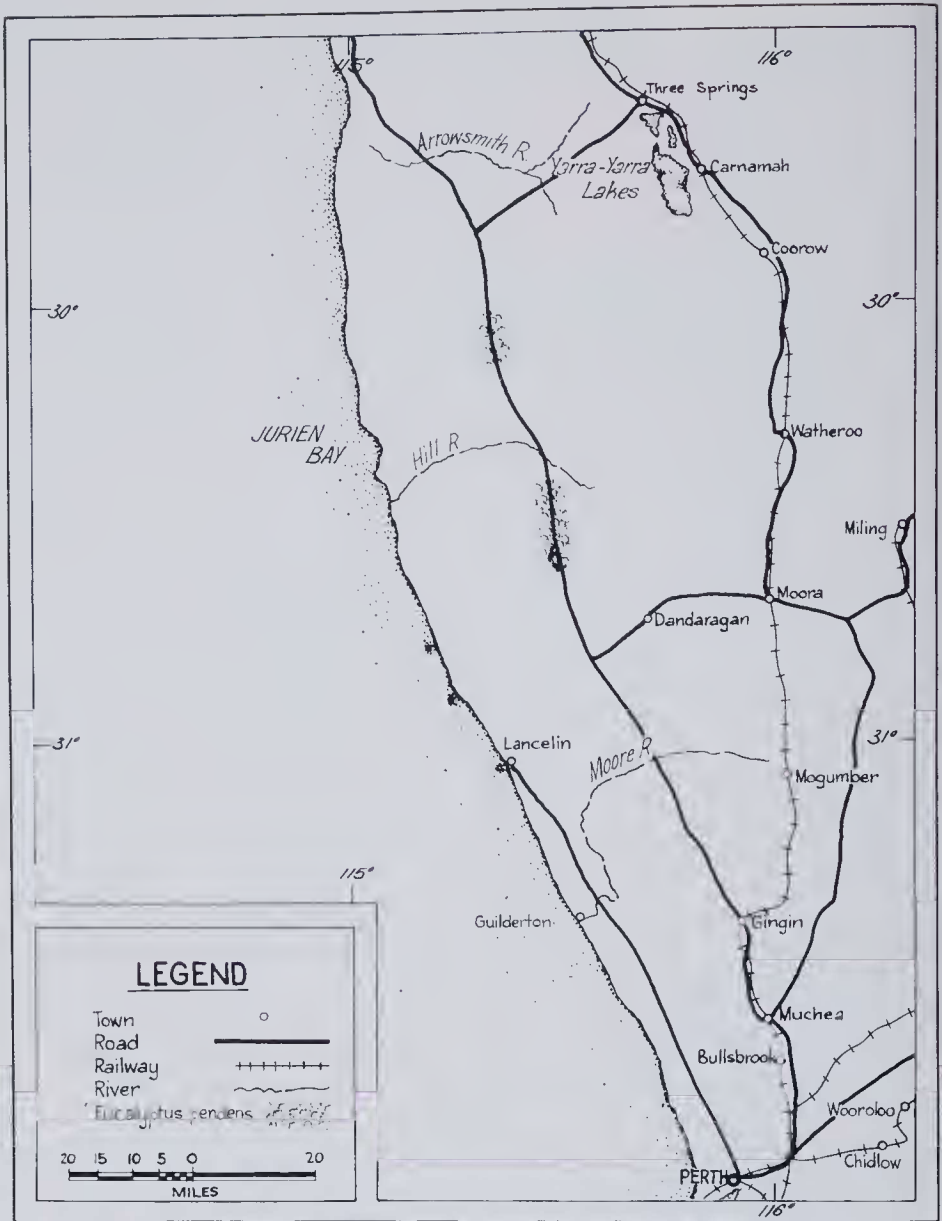


Figure 2—Distribution of *Eucalyptus pendens* sp. nov.

petiolate, decussate, broadly elliptical, markedly undulate, up to 16 x 8 cm. *Adult leaves* petiolate, decussate in bud, finally separated on the axis by intranodes, lanceolate, 6-12 x 1-2 cm the midrib impressed on one or both sides densely reticulate, without apparent oil glands, green, concolorous. Petioles flat, 2-3 cm long.

*Inflorescences* axillary, of 7-11 (13) buds. Peduncles erect, stout, oval or flattened in transverse section, widening at the tip 1.5-4.0 cm long. *Involucre* of six bracts, 5-6 mm long, fused for most of their length, finally deciduous. Bracteate inflorescences occurring in leaf axils while mature expanded inflorescences occur on older branchlets from which the leaves have fallen. *Unopened buds* clavate, without an abscission scar, 9-11 x 6-8 mm tapering into the pedi-

cels which may be flattened or quadrangular, 3-8 mm long. *Operculum* hemispherical and sometimes umbonate, or conical, verrucose and sometimes with 2-3 radial ribs, equal to or shorter than the hypanthium. *Stamens* all fertile. Filaments white and inflexed radially in the bud, non-glandular, acuminate. *Anthers* dorsifixed versatile, reniform-orbicular, opening by oblique, oval, nonconfluent slits. Gland terminal. *Style* glandular, sometimes bent at the top. *Ovary* 4-5 locular, deeply sunk in the hypanthium. *Ovules* in two vertical rows.

*Fruit* ovoid or cylindrical, truncate, 1.3-2.0 x 1.2-2.0 cm, wrinkled or shallowly ribbed. Disc oblique to vertical. Valves 4-5, deeply enclosed.

*Seed* 4-5 x 3-4 mm, dorsal side rounded, ventral side with several ridges ascending to the hilum, black. *Chaff* angular, smaller than seed, red-brown.

*Distribution*: Western Australia, near west coast in the region of the Hill River 120 to 150 miles north of Perth (Figure 2).

*Other collections*: 119.6 miles N of Perth on Gingin-Badgingarra highway (30°18'S, 115°30'E), 14 May 1969, A. S. George 9312, 9314, 9315 (PERTH); 120 miles on same highway (30°18'S, 115°30'E), 6 June 1969, Brooker 1850, 1852 (PERTH); 127.5 miles on same highway (30°12'S, 115°27'E), 6 June 1969, Brooker 1853 (PERTH, AD, GAUBA, CANB, FRI, K, MEL, NSW); 151 mile peg, Badgingarra-Eneabba road (30°02'S, 115°20'E), 30 Aug. 1969, A. S. George 9624 (PERTH).

*Flowering period*: July-August,

*E. pendens* is a remarkable species closely related to and resembling *E. sepulcralis* but differing in bud and fruit morphology (Figure 1). The two species occur approximately 350 miles apart and like some other Western Australian eucalypts they are notable for their restricted occurrence. *E. sepulcralis* occupies a few sites on sandy foothills of the ranges between the Fitzgerald River and Hopetoun on the south coast, *E. pendens* occurs on lateritic sandhills and has been collected only at the localities cited above. The species occurs as isolated groups of slender mallees whose stems are only a few cm in diameter and which emerge above low, dense, sclerophyllous shrubs. The canopy is thin and always pendulous. There are no other *Eucalyptus* species associated with it in the field.

### *Eucalyptus acies* M. I. H. Brooker, sp. nov. (Figures 3 A-C, 4)

*Frutex* "mallee" 1.0-2.5 m altus, vulgo pluricaulis, cortice laeve. *Ramuli* juvenes complanati, quadrangulares. Glandulae oleosae in cortice et in medulla nullae.

*Cotyledones* emarginatae, reniformes, 1.7-2.2 x 1.5-2.0 cm, supra atrovirides, infra atromalvinae. *Folia plantulae* sessilia, decussata, elliptica, 5-7 x 3-5 cm, parum discoloria Axis plantulae verrucosus, glandulosus. *Folia matura* opposita vel sub-opposita, lanceolata ad latelanceolata, symmetrica ad parum falcata, acuminata, coriacea, (8.5) 9.0-13.5 (14.5) x 2.0-3.5 cm, viridia, concoloria. Petioli complanati (1.5) 2.0-3.0 cm longi. Costa mediana distincta, infra prominentior, paribus multis venarum lateralium ab costa mediana sub angulo (40°) 45°-55° (60°) prodeuntibus. Vena intramarginalis ab margine 1-2 mm distans.

*Inflorescentiae* axillares 7-florae. Pedunculi complanati, biconvexi, ad apices latiores, saepe reflexi, (1.3) 1.7-2.3 (2.6) cm longi. Gemma inflorescentiae inapertae rotundata, ab bracteis 4 inclusa.

*Alabastro* clavata sine cicatricibus abscissis, cum pedicellis 1.5-2.1 x 0.7-1.1 cm longa. Hypanthium parum angulare, manifeste costatum, quam operculum vulgo multo longius, 0.9-1.4 cm longum, in pedicellum angustatum. *Operculum* depresso-hemisphaericum, laeve vel parum costatum, saepe breviter rostratum. *Stamina* omnia fertilia. Filamenta in alabastro radiale inflexa, eglandulosa, acuminata. *Antherae* dorsifixae, versatiles, reniformi-orbiculares, ab rimis longitudinalibus obliquis dehiscentes. Glans terminalis. *Stylus* conicus, rectus, alabastro supra filamenta elevatus. Stigma inconspicuum. *Ovarium* quam hypanthium multo brevius, 3(4)-loculare. *Ovula* verticaliter 2-seriata.

*Fructus* hemisphaerico-campanulata costibus prominentibus aliquot, 1.1-1.6 x 1.2-1.6 cm, in pedicello brevi in sectione transversali triangulari 3-8 mm longo attenuata. Annulus calycinus angustus, planus, manifestus; discus latus, conspicuus, planus vel convexus; valvae 3(4), rudimentales, cum disco aequatae.



Figure 3—A—C—*Eucalyptus acies* sp. nov. A—Buds (Brooker 2723). B—Fruit (Brooker 2723). C—Seedling stem (cultivated FRI nursery). D—*Eucalyptus preissiana* Schau. Seedling stem (cultivated FRI nursery).

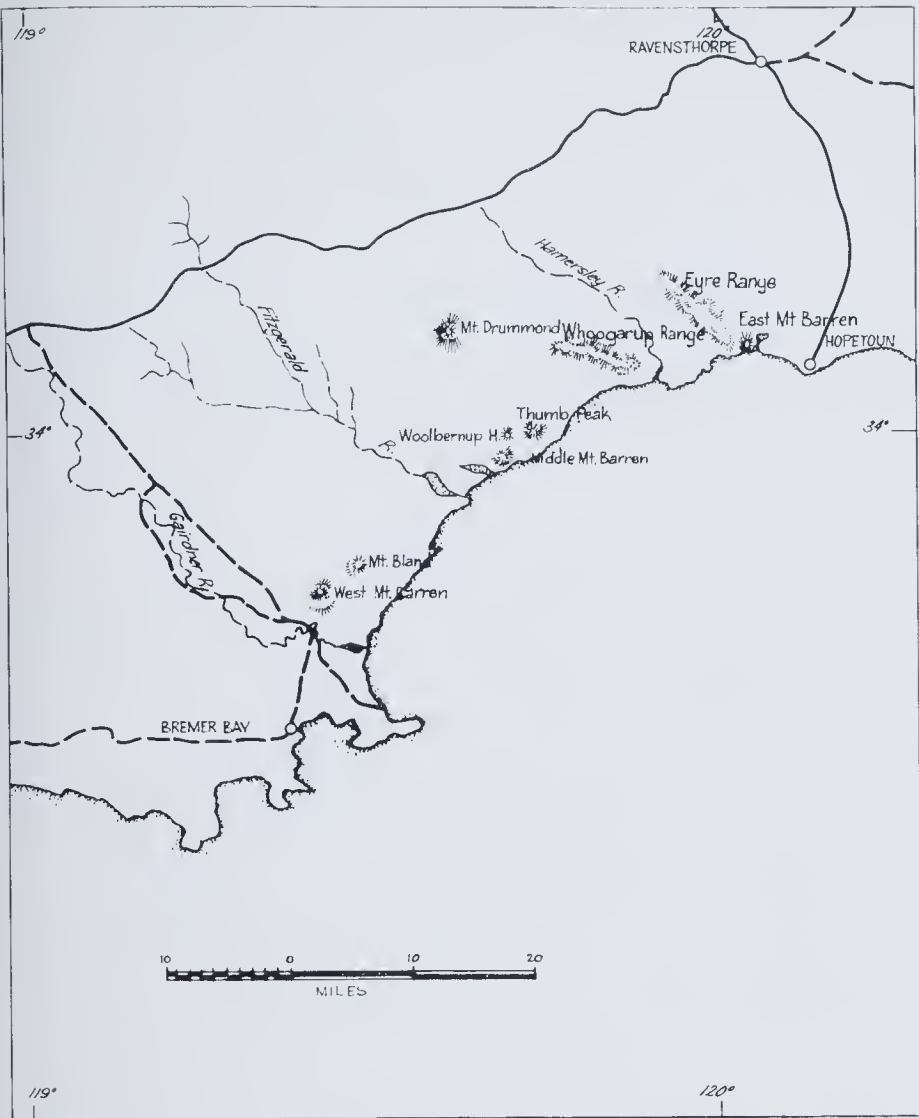


Figure 4—Distribution of *Eucalyptus acies* sp. nov.

*Semina* angulata porcis parum alatis, 2-3 x 2 mm, atro-cinerea vel nigra, aliquantum nitentia.

*Type*: On Woolbernup, a rocky hill in the Fitzgerald River Reserve between Bremer Bay and Hopetoun, Western Australia (34° 02' S, 119° 41' E), 4 Aug. 1970, *M. I. H. Brooker* 2725 (holo: PERTH iso: PERTH, GAUBA, FRI, K, MEL, NSW).

*A mallee* shrub 1.0-2.5 m tall, usually several-stemmed, with smooth bark. *Young branchlets* flattened and quadrangular. Oil glands absent in both bark and pith.

*Cotyledons* emarginate, reniform, 1.7-2.2 x 1.5-2.0 cm dark green above, deep mauve below. *Seedling leaves* sessile, decussate, elliptical, 5-7 x 3.5 cm slightly discolorous. *Seedling axis* verrucose, glandular. *Adult leaves* opposite to sub-opposite, lanceolate to broad-lanceolate, symmetrical to slightly falcate, acuminate, coriaceous, (8.5) 9.0-13.5 (14.5) x 2.0-3.5 cm green, concolorous.

Petioles flat (1.5) 2.0-3.0 cm long. Midrib distinct, more prominent below, with numerous pairs of primary lateral veins at an angle of (40°) 45°-55° (60°). Intramarginal vein 1-2 mm from the margin.

*Inflorescences* axillary, of 7 flowers. Peduncles flattened, biconvex, and broader at the top, often reflexed (1.3) 1.7-2.3 (2.6) cm long. Unopened inflorescence bud rounded, enclosed by 4 bracts.

*Unopened buds* clavate without abscission scars 1.5-2.1 x 0.7-1.1 cm including the pedicel. Hypanthium slightly angular, with prominent ridges, usually much longer than the operculum, 0.9-1.4 cm, tapering into the pedicel. *Operculum* depressed-hemispherical, smooth or shallowly ribbed and often shortly beaked. *Stamens* all fertile. Filaments inflexed radially in the bud, non-glandular, acuminate. *Anthers* dorsifixed, versatile, reniform-orbicular, opening by longitudinal-oblique slits. Gland terminal. *Style* conical, erect, raised above filaments in the unopened bud. Stigma inconspicuous. *Ovary* much shorter than the hypanthium, loculi 3 (4). *Ovules* in 2 vertical rows.

*Fruit* hemispherical-campanulate, with several prominent ridges, 1.1-1.6 x 1.2-1.6 cm, tapering into a short pedicel, triangular in cross-section, 3-8 mm long. Calycine ring narrow, flat and well defined; disc wide, conspicuous, level to convex; valves 3(4), rudimentary, more or less level.

*Seeds* angular, with slightly winged ridges 2-3 x 2 mm, dark grey or black, rather shiny. Hilum area conspicuous. *Chaff* light red-brown, angular, smaller than the seed.

*Distribution:* Western Australia, south coast between Bremer Bay and Hope-toun (Figure 4).

*Other collections:* Thumb Peak Range (34°02'S, 119°43'E), 31 Oct. 1965, A. S. George 7150 (PERTH); Thumb Peak (summit) (34°02'S, 119°43'E), 23 Oct. 1970, R. D. Royce (PERTH); Middle Mt. Barren (34°03'S, 119°41'E), 16 July 1970, A. S. George 10088 (PERTH); Wool-bernap (34°02'S, 119°41'E), 4 Aug. 1970, M. I. H. Brooker 2723 (PERTH).

*Flowering period:* September-November.

*E. acies* is a species of notably restricted occurrence. Its distribution is known only from the above localities which are themselves only a few miles apart. It has not been collected on the intervening plains. The species is therefore likely to be an endemic in the Fitzgerald River Reserve.

The natural affinity of *E. acies* is not clear. It belongs in the *Renantherae* and is probably closest to *E. preissiana* which it somewhat resembles in habit and gross morphology. It differs from *E. preissiana* in having 7 buds to the inflorescence, ribbed hypanthia, filaments which are apparently non-glandular, and glandular-verrucose seedling stems compared with the stellate hairy stems of *E. preissiana* (Figure 3 C, D).

The Series *Preissianae* of Pryor and Johnson (1971) consists of three renantherous species, *E. megacarpa*, *E. preissiana* and *E. coronata* which were incorrectly included by Blakely in the Section *Macrantherae*. Each has 3 buds to the inflorescence and glandular filaments and it may be incorrect to classify *E. acies* with equal status within this Series. As *E. acies* does not resemble other known species I suggest it tentatively be placed in the Series *Preissianae* or be considered as a related, as yet monotypic, Series.

***Eucalyptus loxophleba* Benth. subsp. *gratae* M. I. H. Brooker subsp. nov.**  
(Figures 5, 6).

A subspecies typica foliis, alabastris, fructibusque majoribus differt. *Cortex* laevis, nitidus. *Ramuli* plerumque glauci. *Folia* 7-11 x 1-2.5 cm, nitida. *Pedunculi* complanati, lati, glauci. *Alabastra* 12-15 x 4-5 mm. *Fructus* obconica usque ad 12 x 9 mm pedicellis inclusis.

Type: 0.5 mile west of Burngup, Western Australia (33°01'S, 118°41'E), 3 Nov. 1969, *M. I. H. Brooker* 2273 (holo: PERTH).

Differs from the typical subspecies in the larger leaves, buds and fruit. Bark smooth, shining. *Branchlets* usually glaucous. *Leaves* 7-11 x 1.2-5 cm, glossy. *Peduncles* flattened, broad, glaucous. *Buds* 12-15 x 4-5 mm. *Fruit* obconical, up to 12 x 9 mm, including the pedicel.

*Distribution*: Western Australia, south-west, between Dumbleyung and Lake King (Figure 6).

*Other collections*: 4 miles east of Dumbleyung (33°16'S, 117°46'E), 29 Oct. 1962, *M. E. Phillips* (CBG 023097); 12 miles east of Newdegate (33°06'S, 119°14'E), 30 Oct. 1962, *M. E. Phillips* (CBG 023090); 15.5 miles west of Lake King (33°06'S, 119°23'E) 17 Mar. 1967, *G. M. Chippendale* 225 (FRI); 25.7 miles north east of Lake Grace township (32°52'S, 118°39'E), 17 Mar. 1967, *G. M. Chippendale* 230, (FRI); 25 miles west of Lake King (33°06'S, 119°14'E), May 1969, *B. A. Rockel* (FRI 18598); 10 miles west of Lake Grace (33°06'S, 118°16'E), 3 Nov. 1969, *M. I. H. Brooker* 2268, 2269 (PERTH, FRI, NSW); 0.5 mile east of Cargonocking Hill (32°49'S, 118°04'E), 13 July 1970, *M. I. H. Brooker* 2652 (PERTH).

*Flowering period*: June-October.

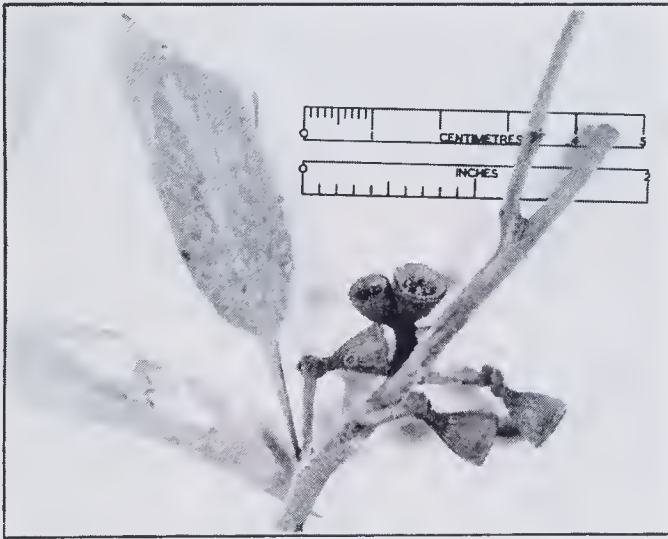


Figure 5—*Eucalyptus loxophleba* subsp. *gratiae* subsp. nov. Fruit (25.7 miles north east of Lake Grace, Chippendale 230).

*E. loxophleba* is a widespread species in south west Western Australia in the 10-20 in. rainfall region. Published by Bentham in 1867, its status was doubted by Mueller (1884) who considered it may only have been a tree form of "*E. foecunda*" (*E. oraria* L. A. S. Johnson). This suggestion was adopted by Luchmann (1898) who indicated it was a variety of "*E. foecunda*" and by Maiden (1909) whose comments on the taxonomy of *E. loxophleba* were confined to quotations from Mueller and Luchmann. Blakely restored *E. loxophleba* to specific status (1934) and it has since been regarded as a distinct species. Blakely, however, seems to have assumed its affinity with "*E. foecunda*" (*E. oraria*) by placing these two species next to each other in his classification. This anomaly was recognised by Pryor and Johnson (1971) who place *E. loxophleba* in the Section *Bisectaria* and *E. oraria* in the Section *Dumaria*. The species of these two Sections are separable on cotyledon shape.



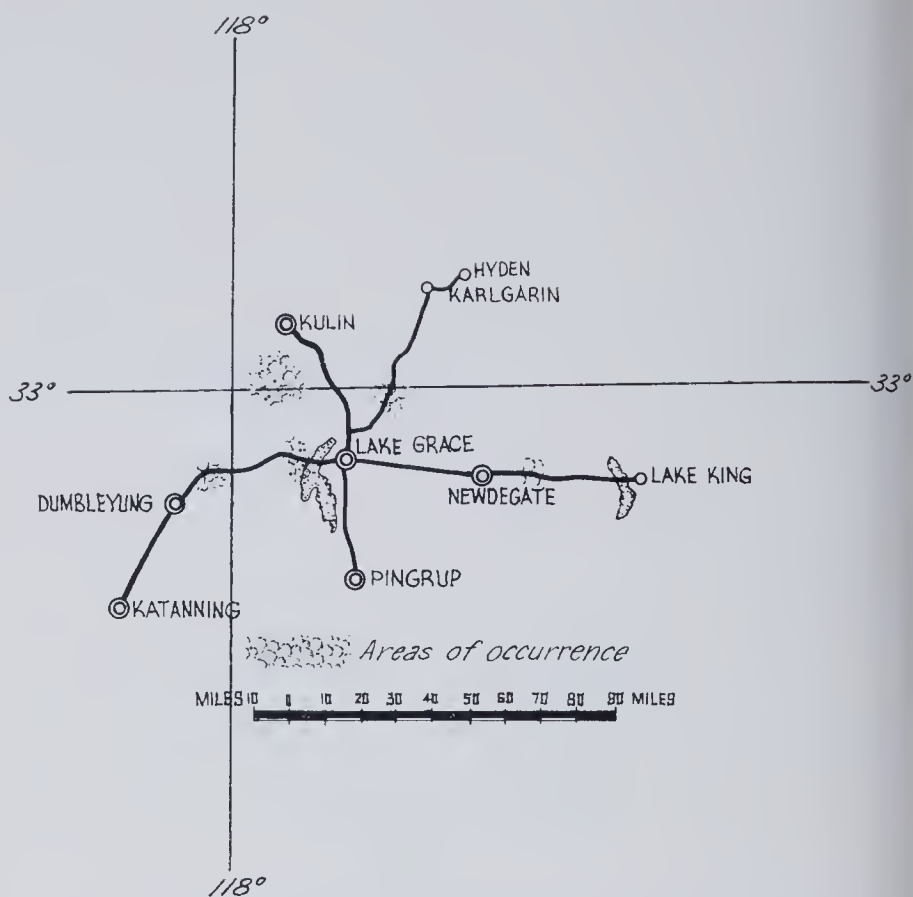


Figure 6—Distribution of *Eucalyptus loxophleba* Benth. subsp. *gratiae* subsp. nov.

*E. loxophleba* is a unique species and when a complete specimen is available it is easily recognizable. It is characterised by bisected cotyledons; glandular pith; prominent leaf venation with the intramarginal nerve well in; thick, inflected filaments in several series, the outer ones long, elbowed in the bud and strongly spreading in the flower, the inner ones short and erect in the flower, some filaments strongly sculptured at the base, all narrowing suddenly to the attachment with the connective: style constricted at the base.

While the above characters are invariable the species is notoriously variable in habit and bark. Typical specimens as described in Benthams are trees with "rough ash grey fibrous bark". This description would suit the species as known in the higher rainfall areas. e.g., at York whence comes its common name. However, the species appears to vary clinally from the higher rainfall to the lower rainfall areas of distribution in that the tree habit is lost to the north and east and also the amount of rough bark becomes less and less until in the dry lands (e.g. Carrabin) *E. loxophleba* is a smooth-barked mallee. Such a cline form is probably what is represented by *E. loxophleba* var. *fruticosa* which Benthams described as a shrub from the Murchison River.

By contrast, subsp. *gratiae* is a distinctive form which occupies a small area of distribution between Dumbleyung and Lake King and the sub-specific name is derived from Lake Grace where it is prominent. It is notable in the

field for its fairly dense rounded canopy of bright green leaves, the smooth trunks and the bright green-leaved seedlings.

***Eucalyptus conglobata*** (R. Br. ex Benth.) Maiden subsp. ***fraseri*** M. I. H. Brooker subsp. nov. (Figures 7, 8).

A subspecies typica habitu et alabastrorum forma differt. *Arbor* erecta ad 20 m alta cortice laevi alba vel cinerea (interdum per 0.5 m e basi fibrosa). *Alabastra* variabilia, sessilia ad breviter pedicellata, operculis pyramidalibus, rostratis vel obtuse conicis, costatis.

*Type*: 14 miles west of Balladonia, Western Australia, 14 Feb. 1970, M. I. H. Brooker 2472. (holo: PERTH; iso: PERTH, AD, GAUBA, BRI, CANB, FRI, K, MEL, NSW).

Differs from the typical subspecies in habit and the form of the buds. An erect *tree* to 20 m tall with smooth white to whitish-grey bark (or sometimes with 0.5 m of basal rough bark). *Buds* variable, sessile to shortly pedicellate, with pyramidal, rostrate or obtusely conical, ribbed opercula.

*Distribution*: Western Australia, north of Esperance and east of Norseman. (Figure 8).

*Other collections*: 2 miles south from Beete Siding (32°44'S, 121°32'E), 7 Nov. 1953, C. A. Gardner 11161 (PERTH); near Balladonia (32°27'S, 123°51'E), 9 Sept. 1962, M. E. Phillips (CBG 021970); east side of pass in Fraser Range (32°02'S, 122°52'E), 18 Oct. 1966, A. S. George 8597 (PERTH); 67.4 miles east of Norseman (32°02'S, 122°52'E), 12 Mar. 1967, G. M. Chippendale 158 (FRI); between 497 and 498 mile peg on Norseman-Esperance Road (32°04'S, 122°29'E), April 1969, B. A. Rockel (FRI 18590); 8 miles north of Salmon Gums (32°52'S, 121°36'E), 15 Feb. 1970, M. I. H. Brooker 2495 (PERTH); 6 miles east of Scaddan (33°56'S, 121°50'E), 8 Aug. 1970, M. I. H. Brooker 2772 (PERTH); between 497 and 498 mile peg on Norseman-Esperance Road (32°04'S, 122°29'E), 13 Sept. 1970, J. Baker 67 (FRI).

*Flowering period*: February.

*Eucalyptus dumosa* var. *conglobata* R. Br. ex Benth, was published by Bentham (1867) who cited two South Australian localities, viz., "Port Lincoln" (Wilhelmi) and "South Coast" (R. Brown). Maiden (1909) published it as a variety of *E. incrassata* Labill. and subsequently raised it to *E. conglobata* (1924). In doing so he inadvisedly chose a later collection from Port Lincoln as the type. It is now known that the Robert Brown specimen at least is extant and is lodged in the Herbarium of the Royal Botanic Gardens, Kew (G. Chippendale pers. comm.).

In the original description of var. *conglobata* Bentham (loc. cit.) did not mention habit though for *E. dumosa* the habit is given as "a shrub or small tree". Bentham's description of the flowers of var. *conglobata* as being "closely sessile, the calyx-tube shorter than broad, angular, and operculum conical" fits the Port Lincoln specimens but is inadequate to embrace all the forms which are now known to occur in the wide distribution from Western Australia to Encounter Bay in South Australia.

One such form is the striking smooth-barked inland tree with the variable bud form (subsp. *fraseri*) compared with the coastal mallee with the strictly closely sessile buds which is typical of the form in the Port Lincoln district and the south coast of Western Australia (subsp. *conglobata*). Maiden (1924) reported trees of *E. conglobata* on Boston Island near Port Lincoln which were "50 feet high". Further collecting is required to sort out the relationship of these trees to subsp. *conglobata* and subsp. *fraseri*.

Pryor and Johnson (1971) accepted *E. conglobata* as a distinct species to include *E. anceps* R. Br. ex Maiden (Blakely) which is given anticipated sub-specific status. In this scheme subsp. *fraseri* should be given taxonomic status equal to both "*conglobata*" and "*anceps*".

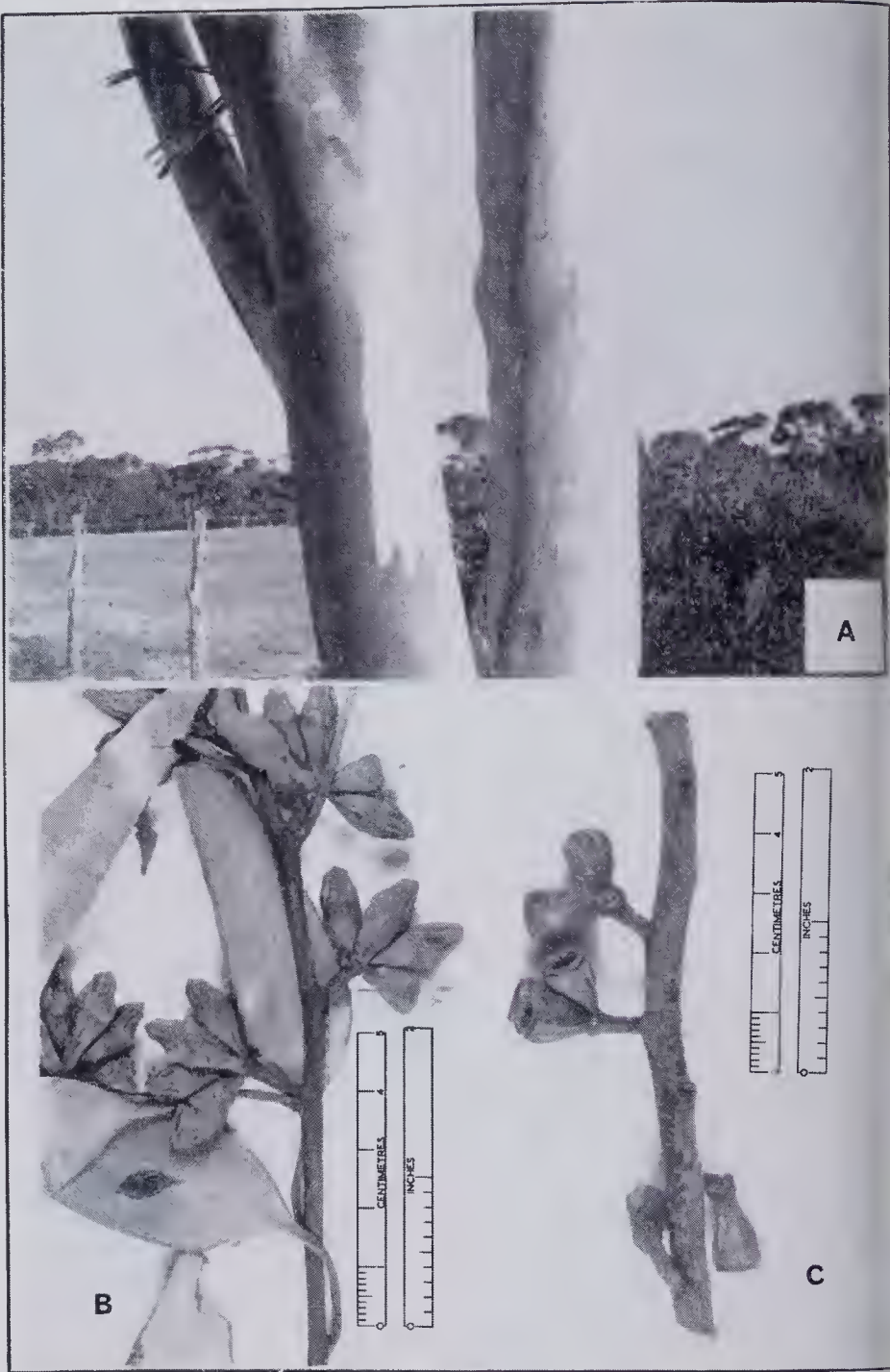


Figure 7—*Eucalyptus conglobata* (R. Br. ex Benth.) Maiden subsp. *fraseri* subsp. nov. A—Bark (Brooker 2495). B—Buds (Brooker 2472). C—Fruit (Brooker 2472).



Figure 8—Distribution of *Eucalyptus conglobata* (R. Br. ex Benth.) Maiden subsp. *fraseri* subsp. nov.

### Acknowledgements

I would like to thank Mr. A. Popplewell for drawing my attention to *E. conglobata* subsp. *fraseri*, and Mr. A. S. George for drawing my attention to *E. pendens* and *E. acies* and for all the latin descriptions. Thanks are also due to Mr. J. Baker for assistance with the description of *E. acies*, and to Mr. N. Hall and Mr. A. Edward for the photographs.

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